

manufacturer to test and to prove the efficiency, because they were in a position to cure defects; but the user was not. Would it not be wiser of the user to adopt the vehicle which after years of use had proved most successful? The roads and other conditions under which a vehicle would be compelled to work had to be considered, and one whose design would not hinder its successful use on Continental roads and under Continental conditions might be, and too often was, a bad failure when brought under Australian influences.

The present high price of benzine induced from the speakers a reference to the hopeful use of kerosene in the near future in the petrol locomotive as well as the stationary engine. Now, a certain Motor Car Company, in Glasgow, had already patented a kerosene vaporiser for use in their motor vehicles, which had been used in South Africa with great success for years, and also in other countries where the cost of carriage, etc., made the use of the higher spirit prohibitive. And at the present time the same had been under trial in this State during the past 4 months with the same marked success, reducing the running cost in this respect one half; and the only drawback to its use was in the case of short runs necessitating too frequent starting, but in the case of longer runs its efficiency was beyond doubt.

As regards the repairing of vehicles, he could not from his experience agree with the remarks of the lecturer, because the agent was or should be more interested in the success of his own vehicle than any other repairer; indeed, the latter might be more anxious to make profit than to ensure success, or he might be a commission agent for some other make of vehicle. Besides, the agent would have his stock of spare parts under his own control to draw from as needed, which any outsider would not have, but would have to depend on getting them from the agent.

Again, the latter would have gained many points in dismantling, replacing parts, and re-assembling and adjusting, and would be better fitted to compare results, having gained intuitiveness from long experience and intimate acquaintance with the fitting of the parts and the working of the machinery. Not only would he thus be in a better position to insure success at the lowest cost, but it was only reasonable to expect that he would be more anxious to do so in order to popularise his agency and the control of it.

The "Running Cost" given towards the end of the paper in "Tables A and B" appeared to be much too high, unless there were some unknown factors in connection therewith, such as frequent starting and stopping, to which also the cost of the tyres had been added.

The foregoing remarks were confined to the business side of the paper, and even in this domain of it many points remained untouched, while a volume might be written in criticism of the mechanical side.

Mr. WILLIAM MCNEIL (Visitor) remarked that with regard to the use of heavy spirit, he did not agree that the heavy spirit was as satisfactory as the lighter fuel, nor did he agree that the mixture of kerosene with benzine was as satisfactory as the pure spirit; and further, he did not think that even with the latest devices for using kerosene only were the results as satisfactory as with spirit. His experience had taught him that since the gradual introduction of heavier spirits troubles had arisen which were never experienced in the early days when only .680 spirit was used; troubles which were perhaps of small importance, but which would not have occurred if the lighter and purer spirit were used. These troubles increased as the spirit varied towards the heavy grade, and which were self-evident with the actual mixture of kerosene with benzine; whilst the trials with

kerosene only, with even the latest kerosene carburetters and vaporisers, were not sufficiently satisfactory to warrant its superseding benzine in the hands of the ordinary driver of commercial vehicles. Generally speaking, he thought the subject of carburation was but imperfectly understood, and until the carburetter was a more reliable article the use of varying grades and mixtures of fuel for ordinary every-day use tended more towards trouble than otherwise, although the experiments and gradual introduction of same would undoubtedly have the effect of eventually bringing forth a device more perfect than the present carburetter.

As to Spare Parts, he did not agree with Mr. Boulton that the car builders, as a body, turned spare parts out more or less on a philanthropic basis, and as one with considerable experience in the manufacture of cars, he (the speaker) knew that the spare part department was a very profitable one. There was a tendency on the part of the builders to overlook the fact that exorbitant prices would force the user to get his replace parts made elsewhere. He admitted that certain parts were better when obtained from the builders, but where this point was of importance was in regard to parts which rarely broke or wore out, and he was satisfied that ordinary parts could be, and were, made by the skilled repairer equally good in quality and finish to those made by the builder, and at a much less cost.

Touching upon the question as to why steam vehicle development had been so slow, he would point out that in the early stages of the commercial vehicle steam held the field, and had better opportunities of placing itself in an unassailable position than petrol, if it had had merits superior to petrol; but the reverse had been proved, hence the fact that up to a load capacity of six tons the petrol vehicle was to-day undoubtedly the standard

article. The great restriction in the development of steam vehicles had been their weight. Large sums of money had been spent upon all classes of small high-pressure boilers, both of the water tube, smoke tube, and flash type, but even the best of these proved unweildy, heavy, and required more attention and upkeep than the petrol car at the same stage of development, and, after years of experiment, these types of steam cars had gradually given way until the only steam cars to be seriously considered now were of the locomotive smoke tube boiler type, making them in comparison with the petrol car both heavy and slow, although in his opinion this type of steam waggon was the most suitable of all for carrying loads exceeding six tons and for dragging a trailer.

THE AUTHOR'S REPLY.

In his reply the Author expressed his gratitude to those members of the Association who had taken part in the discussion, which, in his opinion, was most interesting. Mr. Saunders expressed regret that the Paper had not covered "more ground," but he felt that he had dealt but inadequately with the amount he had endeavoured to cover, and that if the scope were to be widened it would be necessary to write a book.

He could hardly agree with Mr. Saunders in his statement that many engines on the market to-day were identical with those fitted in pleasure cars. Some years ago that was undoubtedly the case; but first one manufacturer and then another had realised the fact that the touring-car engine would not do for commercial work, and the result was that to-day engines in commercial vehicles were of a distinctly different design to those in touring-cars.

To compare a commercial vehicle engine with a heavy duty marine engine was scarcely fair, as the former was essentially limited in size on account of the needs of the loading platform, and also in weight, not only on account of the rubber tyres, but also on account of the vastly increased wear and tear that took place, both on the road and on the vehicle itself where a certain weight was exceeded.

Many experiments were being conducted with kerosene carburettors, and, as stated in the body of the Paper, mixtures of heavy spirits were being made for experimental purposes with satisfactory results.

As regards the question of steel versus rubber tyres: The question depended primarily on the total weight of the machine, the speed at which it was desired to travel, and the class of goods carried on the car. For loads over five tons the consensus of opinion throughout the world was that steel tyres should be used, at any rate on the driving wheels. For loads of four or five tons steel could be successfully used on flat country, where a maximum speed of five miles an hour was sufficient. Below that weight or above that speed rubber should be used in every case. The use of steel tyres inevitably increased the wear and tear, and consequent depreciation, of the machine; and the point had to be found at which the cost of keeping a car in rubber tyres became greater than the increased cost of maintenance and depreciation due to the use of steel.

Mr. Peter McIntosh dealt largely with a comparison between steam and petrol, and he stated "that a keen observer would notice that the waggons in use were from

four to ten years old." As the majority of steam waggon building had been done in England, and as America had only quite recently come seriously into the field of the Commercial Motor, the Author entered into correspondence with Mr. Shrapnell-Smith, the Editor of the "Commercial Motor," with a view to ascertaining, if possible, to what extent the steam waggon was going out of use. This gentleman very kindly went into the matter closely, and circularised every manufacturer of steam waggons with respect to their output, and the following figures had been received in reply; but it must be emphasised that the sales given for each year referred to sales to buyers in Great Britain only, and was quite independent from a large number that were exported annually.

The following table showed the comparison for the last four years:—

1910	1911	1912	1913
269	371	470	551 (10 months only to the end of October.)

These figures showed conclusively that a substantial increase in the number of steam waggons was taking place, and as the figures given represented some 1500 machines, and were probably limited to loads of $3\frac{1}{2}$ to 5 tons, it would be seen that quite a large percentage of the heavy waggons in use in Great Britain was steam propelled.

In view of the rapid progress made with the petrol vehicle, which a few years ago showed every sign of ousting the steam waggon, one might well ask to what this change was due, and it would seem to be primarily due to the increase in the price of petrol, coupled with

the duty that four years ago was imposed on motor-car spirit. At the same time coke fuel had tended to decrease in price, which was once again in favour of the steam engine.

In his remarks, Mr. William McNeil expressed an opinion that naphtha was a far more satisfactory and economic spirit than the heavier benzines, and he based his remarks on the fact that all carburettors in use today were nothing but modified forms of the old surface carburettor. That being the case, he contended that the most volatile spirit should give the best results.

In his reply, Mr. Boulton pointed out that all available experience was against this. The heavier spirit having a far greater thermal efficiency, it was obvious that, its heat value being greater, its propelling capacity must also be greater. The whole question, therefore, resolved itself into one of whether the heavier spirit would be as easily or as satisfactorily carburetted as the lighter? Undoubtedly more air would be necessary to cause complete combustion, and as there was nothing in the way of obtaining that, the obvious result of a mixture of a smaller quantity of spirit with a large volume of air must be that less spirit was consumed in doing the same quantity of work, with the result that it must go further. Add to that the fact that its calorific value was greater, and one could easily appreciate that the smaller quantity of spirit would yield more power, and that the expansion of the gases due to the explosion must be greater and longer sustained. Practical experience, as instanced by the experiments of Mr. Iden, referred to, showed that this was actually so in practice, and whilst one must admit that existing carburettors were not in any way perfect,

still the use of heavy spirit could do much to keep the cost of fuel at a minimum. It might be that the existing high price of petrol would probably attract the energies of inventors in the direction of fuel-saving devices, and it was to be hoped that, as in other branches of engineering, devices would be found during the next few years that would make the petrol consumption of to-day as ridiculous ten years hence as were those that we look back at of ten years ago.
